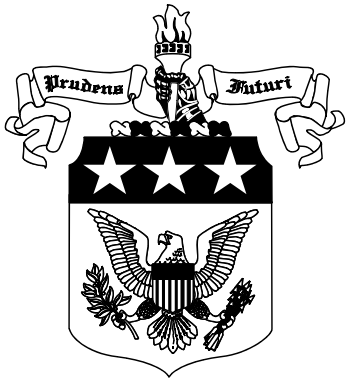
Strategy Research Project

INSTITUTIONALIZING SUSTAINABILITY INTO THE TOTAL ARMY

BY

MR. DOUGLAS A. WARNOCK
Department of Army Civilian

USAWC CLASS OF 2008



U.S. Army War College, Carlisle Barracks, PA 17013-5050

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
15 MAR 2008	**Strategy Research Project**	**00-00-2007 to 00-00-2008**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Institutionalizing Sustainability into the Total Army	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Douglas Warnock	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
U.S. Army War College ,122 Forbes Ave.,Carlisle,PA,17013-5220	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
See attached

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**50**	

The U.S. Army War College is accredited by the Commission on Higher Education of the Middle State Association of Colleges and Schools, 3624 Market Street, Philadelphia, PA 19104, (215) 662-5606. The Commission on Higher Education is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Council for Higher Education Accreditation.

USAWC STRATEGY RESEARCH PROJECT

INSTITUTIONALIZING SUSTAINABILITY INTO THE TOTAL ARMY

by

Mr. Douglas A. Warnock
Department of Army Civilian

Dr. Kent Butts
Project Adviser

This SRP is submitted in partial fulfillment of the requirements of the Master of Strategic Studies Degree. The U.S. Army War College is accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools, 3624 Market Street, Philadelphia, PA 19104, (215) 662-5606. The Commission on Higher Education is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Council for Higher Education Accreditation.

U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

ABSTRACT

AUTHOR: Mr. Douglas A. Warnock

TITLE: Institutionalizing Sustainability into the Total Army

FORMAT: Strategy Research Project

DATE: 14 March 2008 WORD COUNT: 10,298 PAGES: 50

KEY TERMS: Green Buildings, Sustainable Practices, Environment,

CLASSIFICATION: Unclassified

Globally, we are living in an unsustainable state. The Earth's major life-supporting resources are declining, while at the same time human consumption of, and demand for, those resources continue to rise. The U.S. Army is a microcosm of the Earth and is in an unsustainable state. The Army defines sustainability as meeting current as well as future mission requirements worldwide, while safeguarding human health, improving quality of life, and enhancing the natural environment. Sustainability affects the institutional and operational missions of the Army. Implementing sustainability makes good business sense for the Army with tangible and intangible benefits. Army sustainability is a national security imperative and it is clear that linkages between the environment and security are powerful and important. There are embedding mechanisms available to Army senior leaders as ways and means to institutionalize sustainability throughout the entire institution. The purpose of this paper is to provide a background of the concept of sustainability; discuss its impact on Army readiness and national security; and to offer recommendations on how the Army should approach institutionalizing sustainability into its culture.

INSTITUTIONALIZING SUSTAINABILITY INTO THE TOTAL ARMY

Background

> The Army's global framework of installations, facilities, ranges, and other critical assets must be effective, efficient, properly distributed, and capable of ensuring it supports the joint force and the defense of our Nation. Sustainability is the paradigm that will focus our thinking to address present and future needs while strengthening community partnerships that improve our ability to organize, equip, train, and deploy our Soldiers as part of the joint force.
>
> —Honorable Keith E. Easton,
> Assistant Secretary of the Army for Installations and Environment[1]

Army sustainability is a national security imperative. A sustainable Army simultaneously meets current and future mission requirements worldwide, safeguards human health, improves quality of life, and enhances the natural environment.[2]

Globally, we are living in an unsustainable state. The Earth's major life-supporting resources are declining, while at the same time human consumption of, and pressure on, those resources continues to rise. Today, the competition for renewable and nonrenewable resources such as food, water, fossil fuels, precious metals, minerals, lumber and undeveloped areas are stressing the earth's ecosystems beyond its ability to recover. In this global context, "Sustainability" is the ability to achieve continuing economic prosperity while protecting the natural systems of the planet and providing an acceptable quality of life for its people. Achieving sustainable solutions calls for stewardship of these resources, with stakeholders taking responsibility for solving the problems of today and tomorrow -- individuals, communities, businesses, academia, governments and nation states are all stewards of the environment.

The mechanisms that provide essential life-supporting resources for society's continued existence on the planet, such as clean air, clean water, productive topsoil and

other resources, are in decline and are the cause of our current global unsustainable state. At the same time, society's demand for these resources is increasing. Metaphorically, the current global unsustainable state of shrinking supply and increasing demand may be viewed as a closing funnel where the walls are nearing intersection and there is less room to maneuver. The arrows shown in Figure 1 depict the concept of the resource funnel.

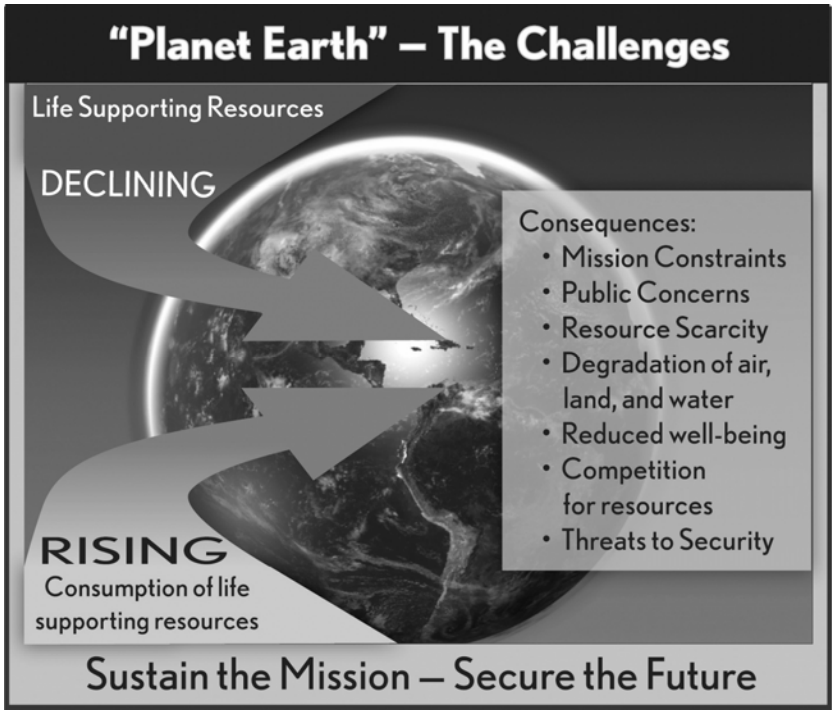


Figure 1: The "Closing Funnel" depicting the relationship between diminishing supply and rising demand of resources.[3]

With the awareness that we all live in this funnel, individuals, businesses, governments, families, schools, etc., have the opportunity to change the impacts we are having and be more strategic in our thinking when making choices and long-term plans. Sustainability advocates believe that through strategic planning, systems thinking, innovation, creativity and the unlimited potential for change we can catalyze the shift

from an unsustainable state towards a more sustainable condition and begin to open up the walls of the funnel.

A more systematic approach to determine sustainability is found by using *The Natural Step's Four System Conditions.*[4] The scientific principles on which the Natural Step framework is based were used by Swedish physicist Dr. John Holmberg and Swedish medical doctor and oncologist Dr. Karl-Henrik Robert to generate four basic "system conditions" or conditions for sustainability. One advantage of adopting the Natural Step is that it provides principles that are grounded in science and thus measurable.[5] The development of the *Four System Conditions* articulates a framework for understanding sustainable human activities through a set of principles.[6] The Natural Step Framework holds that in a sustainable society, nature would <u>not</u> be subject to systematically increasing:

- concentrations of substances extracted from the Earth's crust;
- concentrations of substances produced by society;
- degradation by physical means; and,
- in that society, human needs are met worldwide.

Defining Sustainability

There is a variety of definitions to the term "sustainability" and many of the organizations and communities embracing the concept have defined it in various ways. The classic definition comes from the United Nations (UN) Brundtland Commission, which coined what has become the most often-quoted definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[7]

People and institutions define sustainability in many other ways as they seek to understand the linkages between economic development, the environment and quality of life. While there are differences between the definitions, there are also common threads that tie together the various interpretations. The following is a sampling of definitions:[8]

- Sustainability is "...using a resource so that it is not depleted or permanently damaged". (Webster's Dictionary)
- Sustainability means "…meeting the needs of the present without compromising the ability of future generations to meet their own needs." (Environmental Protection Agency)
- "Sustainable development is the process of working towards the long term health and vitality of our city and its citizens with regard to ecological, social, cultural, and economic processes." (Sustainable Calgary)
- A sustainable city is a "...place where present day decisions about resource use and land development do not impinge on the quality of air, water, land and the economic livelihood of future generations." (Minneapolis Plan)
- "Sustainable development - decisions and choices made today, should not limit the choices and opportunities of future generations." (Burlington Vermont Comprehensive Plan)
- "Sustainability refers to the ability of a society, ecosystem, or any such ongoing system to continue functioning into the indefinite future without being forced into decline through exhaustion...of key resources." (Robert Gilman, President of Context Institute)

- Sustainability is "...improved quality of life within the means of nature." (Sara Severn, Nike Inc.)
- "Sustainability is an over-arching concept incorporating appropriate sustainable design elements into facilities planning, design, construction, operation and maintenance to enhance and balance facility life cycle cost, environmental impact, and occupant health, safety, security, and productivity." (National Aeronautics and Space Administration)
- Sustainability is "An economic state where the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment for future generations." (Paul Hawken, author and businessman)
- "A sustainable community is one that seeks improved public health and a better quality of life for all its residents by limiting waste, prevent pollution, maximizing conservation and promoting efficiency, and developing local resources to revitalize the local economy." (Concern, Inc.)
- "Essentially, sustainability is the effective use of resources - natural, human, and technological - to meet today's community needs while ensuring that these resources are available to meet future needs." (Don Geis and Tammy Kutzmark in Developing Sustainable Communities: The Future Is Now)

This list is not to confuse the reader on the definition of sustainability but to show the broad interpretation of the concept. Despite the plethora of definitions, sustainability remains a broad concept lacking universal standards of practice but it can be argued that this is intentional. To integrate or institutionalize sustainable practices into the

corporate culture, each organization pursuing sustainability must define it in terms that are important and applicable to their own operation or mission.

Non Department of Defense (DoD) Sustainability

Sustainability is not a new concept. The public and private sectors such as Nike, Starbucks, Ford Motor Company and Calgary, Canada have embraced sustainability in their operations. In fact, the United States (U.S.) Federal government focused on sustainability as early as 1910 when President Theodore Roosevelt recognized that our government and its citizens have an obligation to protect our natural resources from waste in the present while preserving them for future generations. He said, “I recognize the right and duty of this generation to develop and use the natural resources of our land; but I do not recognize the right to waste them, or to rob, by wasteful use, the generations that come after us.”[9]

In addition, communities such as Whistler, British Columbia, Canada and corporations such as Interface, Inc. and IKEA have adopted the Natural Step and have become more sustainable (hence more profitable) as a result. These companies have completely re-thought their business practices. They have examined and changed their processes including manufacturing, transportation, construction of facilities, maintenance, waste management and their procurement of materials.

Corporate references to sustainability and the operative process of "green business" have become almost commonplace to the private sector over the past decade. Companies have discovered that techniques for pursuing sustainability often have positive effects on corporate profitability. “Corporate sustainability”[10] means balancing economic considerations against the long term effect on the environment and

society. Many companies strive for being environmentally responsible and a good corporate citizen while maintaining a profitable business.

Sustainability covers a vast array of systems and functional areas. The implied preference would be for systems to be productive indefinitely, or “sustainable." For instance, "sustainable agriculture" would expect agricultural systems to last indefinitely while "sustainable development" would be the development of economic systems that last indefinitely. Other examples are sustainable communities, sustainable cities, sustainable forests, sustainable businesses, sustainable governments, sustainable living, and sustainable purchasing. Sustainability principles touch each of us, including where we work, where we live, where we attend school, what we buy, and what we do in our leisure time.

Army Sustainability

So what is a sustainable Army? The Army uses the definition of sustainability from *The Army Strategy for the Environment – Sustain the Mission, Secure the Future* where it states a sustainable Army “simultaneously meets current as well as future mission requirements worldwide, safeguards human health, improves quality of life, and enhances the natural environment.”[11] It may be more clearly stated that, to the Army, sustainability means using available resources wisely so they do not become depleted or permanently damaged for future generations thereby compromising future mission requirements.

It should be noted the difference between the term sustainability used in the context of this paper versus the term used by the Army G4 (logistics) community. Army Regulation 700-138 defines sustainability as “The capability to maintain the required

level (intensity) and duration (time) of military operations to achieve the planned objectives or outcomes. It represents the balanced capability for all logistics and combat service support (arm, fix, fuel, move, and soldier support) functions that provide the staying power, over time, for the supported force. Includes the force structure, prepositioned and war reserve materiel, prescribed loads and operating stocks, and the wholesale sustaining and industrial base which in their totality comprise Army capability to project and reconstitute the Total Army Force."[12] While the logistics community will play a key role in institutionalizing sustainability into the Army culture, their definition of sustainability differs from the term used in the framework of this paper.

The history of the Army's sustainability efforts began in June 2000, when the Senior Readiness Oversight Council (SROC) convened to assess challenges to readiness resulting from encroachment of DoD training and testing ranges. The SROC is chaired by the Deputy Secretary of Defense, is composed of senior military and civilian leaders of the Joint Chiefs of Staff and military components, and advises the Secretary of Defense on matters pertaining to DoD readiness. The SROC concluded that encroachment presents an increasing limitation on the military's capability to conduct realistic and effective live training and testing, and that outreach programs must communicate to Congress, the media and the public, the importance of training ranges to the readiness of forces. The SROC agreed that a comprehensive and coordinated approach to the problem of encroachment was needed and directed that a strategy be developed. The SROC, in their 2001 Report to Congress, identified issues deemed to be impacting military readiness and training. They identified issues that are of concern to installations as well as the surrounding communities and regions and concluded that

DoD needs an integrated and collaborative approach with strategic and master planning to identify and address these concerns.[13] These issues were endangered species, unexploded ordnance (UXO) and constituent contamination and clean-up, frequency encroachment, maritime sustainability, air quality, airborne noise, urban growth, community outreach, overseas ranges, airspace restrictions, water use, cultural resources, ecosystem biodiversity, and land use to include Native American and civilian access as well as resource extraction.

In response to the SROC, the U.S. Army Forces Command (FORSCOM) established an Installation Sustainability Program (ISP) in July 2001. Under the FORSCOM ISP, the development of installation level strategic plans focused on long-term objectives of sustainability across all installation operations through lifecycle cost-effective investments implemented over a 25-year period, with specific resource requirements identified in a 5-year installation action plan.[14] The ISP was designed to ensure that Army installations were positioned to continue their service to the nation today and far into the future. The effort is an ongoing process that requires active engagement and a cross-functional approach of garrison staff, directorates, tenants, regulators, and state and local community officials to create and achieve long-term sustainability goals.

Today, a total of 18 Army installations have formally pursued the quest for sustainability. Each held sustainability planning workshops that involved internal and external stakeholders in the ISP process and developed installation sustainability plans to document their 25-year sustainability goals. Additional Army installations are in the

planning stages for developing their sustainability workshops in order to develop their long-term sustainability goals.

Sustainability requires a systems perspective analysis. Army sustainability is not one specific practice or initiative to create incremental improvement, but is a comprehensive strategic principle that transforms Army thinking, changes the culture, and shifts paradigms to create a more effective and resilient future force. The quest towards sustainability requires integrating the Army's mission, as well as economic, financial, social, cultural, political, and ecological factors. It requires the constructive articulation of the top-down approaches of policy and development with the bottom-up or grassroots initiatives. Moreover, it requires the simultaneous consideration of the cross-functional perspective as well as the local and global dimensions and of the way each interacts.

There are requirements for Federal agencies to pursue sustainable practices. President George W. Bush signed the most recent Federal mandate in January 2007. Executive Order (EO) 13423, *Strengthening Environmental, Energy, and Transportation Management* requires Federal agencies to lead by example in advancing the nation's energy security and environmental performance by achieving goals in energy efficient vehicles, petroleum conservation, alternative fuel use, energy efficiency, reduction in greenhouse gases, renewable power, building performance, water conservation, procurement, pollution prevention, electronics management, and environmental management systems.

Sustainability is conducting Army operations and missions today in a manner that will not prevent or preclude its ability to conduct necessary operations and missions 25

or 30 years from now -- and will not affect the ability of surrounding communities to be healthy places to live and work in the future. Army sustainability moves us beyond simply solving today's problems. A sustainable Army is one that wins today's battles while laying the foundation for future success. It connects today to tomorrow with sound business and environmental practices. Sustainability enables today's Army to empower the Future Force.

Operational and Institutional Missions

The Army conducts both operational and institutional missions. The operational Army consists of numbered armies, corps, divisions, brigades, and battalions that conduct full spectrum operations around the world. The institutional Army supports the operational Army and provides the infrastructure necessary to raise, train, equip, deploy, and ensure the readiness of all Army forces. The training base provides military skills and professional education to every Soldier and allows the Army to expand rapidly in time of war. The industrial base provides world-class equipment and logistics for the Army. Army installations provide the power-projection platforms required to deploy land forces promptly to support Combatant Commanders. Upon deployment of those forces, the institutional Army provides the logistics needed to support them. Without the institutional Army, the operational Army cannot function. Without the operational Army, the institutional Army has no purpose.[15]

Currently, the focus of the Army sustainability efforts has been on the institutional Army. In order for the Total Army to be truly sustainable, both operational and institutional missions should fully inculcate sustainability principles.

The Business Case

Implementing sustainability makes good business sense for the Army with tangible and intangible benefits. Garrison and installation commanders and managers benefit from implementing sustainability by realizing tangible savings in reduced energy and water consumption; reduced waste streams and air pollution; reduced requirements for supporting infrastructure; improved facility system performance; and reduced operations, maintenance, and decommissioning costs. The intangible benefits include reduced absenteeism, improved employee morale and productivity, and positive community recognition.

Industry experience indicates that the incorporation of many sustainability concepts with the potential for significant life-cycle savings shows little or no increase in project first costs. This is particularly true with the design of green (sustainable) buildings. Regardless of the extent to which sustainability is applied, the additional investments are highly likely to produce life-cycle paybacks.

For example, a study of 33 green buildings in California found that the average cost of building green over traditional methods was about 2%. The average energy reduction from the 33 buildings was 30 percent. This alone provides savings sufficient to pay back the initial 2% premium in less than 9 years. The same study found that, over a twenty-year period, the overall net savings for a green building is between $48.87 and $67.31 per square foot, depending on the LEED[16] rating of the building. Therefore, an initial investment of only 2% of the first costs results in savings worth more than ten times the added premium.[17]

The savings from implementing sustainability concepts contain many subjective elements, including improved employee morale and effects of environmental

improvements (higher productivity, less sick leave), making them difficult to quantify within a life-cycle analysis. A report by the U.S. Department of Energy and the Rocky Mountain Institute documents eight case studies, in which efficient lighting, heating, and cooling measurably increased worker productivity, decreased absenteeism, and/or improved the quality of work performed.[18]

The Challenge

The Army as an institution is a microcosm of the world and, when not meeting the Natural Step's *Four System Conditions*, is in an unsustainable state. If the Army continues on this unsustainable path, then inadequate training facilities, substandard installations and the lack of support for recruiting, organizing, supplying, equipping, training, servicing, mobilizing and demobilizing its Soldiers will undermine the mission.

The Army's mission is to provide ready forces and land force capabilities to the Combatant Commanders in support of the National Security Strategy, the National Defense Strategy and the National Military Strategy.[19] The Army "trains like it fights, and fights like it trains" and any impediments to its training will impact its readiness to support the Combatant Commanders. Training and readiness issues are the primary focus challenging the Army. These challenges deal with internal and external pressures that impact the ability of the Army to train to doctrinal standards or perform the missions assigned to the installation. These challenges include issues related to resource availability; community planning and perception; and land use planning, maintenance and rehabilitation.[20]

The current challenges the Army faces concerning sustainability are: water quality and quantity, air quality, solid waste, noise, natural and cultural resources, threatened

and endangered species, airspace restrictions, radio frequency encroachment, ecosystem biodiversity, urban growth, encroachment and land use, unexploded ordnance and constituent contamination and clean-up.[21] The next section will discuss specific examples of challenges the Army is facing.

The diversity of missions and vast geographic locations of installations provide unique challenges for the operational and institutional missions of the Army and its quest for sustainability. The Army has approximately 154 major installations[22] with locations in a variety of climatic regions including humid continental, humid subtropical, semi-arid, marine west coast and tundra. In addition, each installation is unique in regards to its mission or set of missions. The Army has installations that are centered on troop training and ranges; industrial and maintenance activities; medical support; research and development; and schools and education – or a combination of two or more.

Sustainability remains a broad concept but the Army, like any other organization, defines it in terms that are important and applicable to its own mission. There is a business case for the Army to pursue sustainability as industry shows tangible and intangible benefits. Internal and external pressures challenge the future of the Army to fulfill its mission, but a sustainable Army can overcome these challenges.

Sustainability and National Security

The unsustainable world in which we live has an impact on our national security. Today it is clear that linkages between the environment and security are powerful and important. Many times, policymakers fail to see the extent to which environmental stresses, such as climate change and water scarcity, can undermine social and political

stability, hamper economic development, and generate conflict and instability. In addition, regional and local issues such as natural disasters and ecological degradation are evolving into transnational, global issues that the U.S. must confront.[23]

Sustainability as it affects the Army can be analyzed at two levels -- the global level and institutional/operational level. Globally, national security implications could include conflict due to resource scarcity; heightened internal and cross-border tensions caused by large-scale migrations; increased disease proliferation (which will have economic consequences); and some geopolitical reordering as nations adjust to shifts in resources and prevalence of disease.[24] At the institutional and operational levels, the challenges the Army faces are primarily with training and mission readiness.

National Security at the Global Level

At the global level, the Army will have to deal with more conflicts in the future due to the unsustainable state of the world. As discussed earlier, the quality and availability of resources are on a decline while at the same time the world's demand for these diminishing resources continues to grow. Indeed, some experts predict that access to water as a resource will become comparable to access to oil as a source of local, regional and global instability and violence.[25] The global, regional and local environments compromises national security due to this unsustainable state that leads to an unstable future primed for violence between groups competing for the accessibility to the shrinking supply of resources.

Climate change and water scarcity are examples of national security challenges facing U.S. policy makers and the military. One of the elements of sustainability is making human economic systems last longer and have less impact on ecological

systems. An example of how this relates to global problems is with issues of climate change. Climate change is the manifestation of an unsustainable world due to anthropogenic activities changing the environment thus influencing the climate. The biggest factor of present concern is the increase in carbon dioxide levels due to emissions from fossil fuel combustion. A recent joint study[26] by two U.S. think tanks developed three climate scenarios, considered the projected environmental effects of global warming, and mapped out the possible consequences for peace and stability. As a result, analysts expressed national security concerns, including the possibility of a link between climate change and terrorism.[27] Moreover, others have maintained that global climate change represents a more serious threat than terrorism.[28]

The study explained that rising sea levels, extreme weather events, and other effects of climate change might affect U.S. military installations over the next three to four decades. For example, rising sea levels would adversely impact installations located along coastal areas. In addition, hurricanes could threaten U.S. military facilities and extreme hot or cold weather could disrupt U.S. military operations. The report added that allied militaries might offer less support for joint missions if they also have to respond to environmental threats.[29] The study also cautioned that extreme environmental conditions could degrade weapons systems and adversely impact the health and well-being of military personnel. In national security planning it is important to anticipate future threats and to begin preparations and planning as soon as possible. For example, it generally can take approximately 30 years to design, test and produce a weapon system and bring it to the battlefield.[30]

Dr. Kent Butts, a professor at the U.S. Army War College, characterizes three levels at which climate change affects U.S. security. At a **global level**, Dr. Butts states "…climate change affects moisture patterns and energy retention and will have a direct impact on the Earth, the U.S. and its possessions and reduce the resources upon which human kind depends…" At a **geopolitical level** "…the melting icecaps, rising sea levels and loss of habitable space are creating new geopolitical areas of concern and complicate the ability of defense planners to project power, influence regional events and secure forward basing..." Finally, at the **regional level** "…changes in climate will threaten the survival of fragile states, create opportunities for extremist ideology and insurgencies, put at risk access to strategic fuel and non-fuel resources, and create instability that threatens U.S. national security interests…" [31]

The world is in an unsustainable state as it continues to incur a vast water deficit by consuming water belonging to future generations. The world water deficit is a recent phenomenon -- a product of the high water demand over the last half-century and the rapid worldwide spread of powerful diesel and electrically driven water pumps. The vast impermeable surfaces (e.g. streets and parking lots) from urbanization restricting groundwater recharge and the drilling of millions of wells worldwide has pushed water withdrawals beyond the recharge of many aquifers.

Limited access to water may be comparable to the current demand for oil and may lead to instability and violence. Water scarcity also shapes the geopolitical order when states engage in direct competition with neighbors over shrinking water supplies. A recent study analyzes a conservative scenario of an average warming of the Earth by 1.3 degrees Celsius could cause water scarcity affecting up to 1.7 billion people.[32]

Populations will migrate in search of new water supplies, moving within and across borders and creating the conditions for social or political upheaval along the way.

The Army recognizes that an unsustainable state at the regional and local levels are "evolving into global issues that influence how the U.S. must respond and interact – through political, economic and when necessary, military engagement."[33] Indeed, climate change and water scarcity will have an impact on national security and military operations as the nation calls upon the military to provide stability and/or humanitarian relief to the affected region.

National Security at the Army's Institutional and Operational Levels

At the institutional and operational levels, the challenges the Army faces are primarily with training and readiness issues. The institutional mission of the Army is already experiencing constraints to training and readiness at their installations. Growing encroachment pressures, such as development adjacent to ranges, restrictions imposed by regulations, and competition for airspace and communication spectrum, are increasingly impeding the Army's ability to conduct training and testing in realistic environments.

Until the last decade, the U.S. military did not have to compete directly for air, water, and land resources with its surrounding communities. However, open space around the U.S. continues to decrease as development keeps pace with population growth. In many cases, communities have grown around once-remote Army installations and ranges. Now, however, many installations are required to compete for and share resources with their communities. This competition has, in many instances, impacted or curtailed training that is vital to maintain the readiness of the Army.

The expansion of communities around Army installations is a trend near many large power projection and power support platforms as well as around military industrial complexes such as depots, research and development facilities, and ammunition plants. Army Transformation and unit re-stationing from Europe and Korea will cause unit increases at selected installations while causing others to downsize or be eliminated. The impacts of urban growth were a consideration in making these decisions. Issues such as contaminated groundwater, threatened and endangered species, frequency encroachment, noise, and cultural resources have an impact on many Army installations and subsequently on military training and readiness.

The Massachusetts Military Reservation (MMR) and the Makua Valley Training Area in Hawaii are two areas that have experienced severe training restrictions because of concerns about UXO and other ordnance constituents migrating off-post through groundwater and potential contamination of sole source aquifers in the areas. The concerns caused a total cessation of training at MMR and severe restrictions at Makua Valley.[34] In fact, Administrative Orders issued by the U.S. Environmental Protection Agency (EPA) suspended all artillery, mortar and demolition training at the MMR due to public concerns about the contaminated sole-source aquifer.[35] Suspension of such activities impacts military training and readiness.

Many training installations are required to manage various threatened and endangered (T&E) species such as the red-cockaded woodpecker, bald eagle, and the American alligator. Fort Benning, GA, Fort Polk, LA, and Fort Stewart, GA all have endangered species recovery plans that have imposed training restrictions on the military training range areas. Outside the fence line, areas surrounding Fort Hood, TX

have been developed for private housing without regard to preservation of habitat causing T&E species to migrate onto Fort Hood training areas -- the only remaining habitat in the region. Fort Lewis, WA has some of the only old growth forest habitat for the spotted owl remaining in the Puget Sound area, which ultimately restricts the type of training that can be conducted in areas of old growth forests on the installation. Yakima Training Center (YTC), WA has rangelands that are restricted for training because it provides some of the only suitable habitat for the western sage grouse left in the state. In addition, the private rangeland surrounding YTC has been denuded of the necessary cover habitat the birds require because of cattle grazing and periodic range fires. The National Training Center (NTC) at Fort Irwin, CA, must protect habitat designated as critical for the Desert Tortoise, again, creating training restrictions for certain areas of the installation.[36]

There are radio frequency encroachment issues at both the NTC as well as the Joint Readiness Training Center at Fort Polk. These issues have not imposed any training restrictions but they do pose training detractors as the range officers have to deal with reduced bandwidth when planning the use of training simulators and gathering electronic training data.[37]

Community complaints about noise from weapons firing on ranges are also an issue at Fort Hood, Fort Stewart, and Fort Riley, KS. Noise from aviation operations cause community complaints at Fort Bragg, NC, and Fort Campbell, KY. Night flying restrictions for Army aviators in Germany severely restricted training to the point that pilots were having difficulty achieving minimum training standards for night vision flying causing readiness issues for aviation units.[38]

Regarding cultural resources, there are more than 2400 protected archeological sites at Fort Hood and the Army is anticipating finding an estimated 4000 sites on Fort Benning. Likewise, there are protected archeological and cultural sites in training areas at Forts Bliss, Riley, and Sill as well as YTC. All these sites must be protected or preserved and pose some restrictions on training.[39]

Success for installations on the quest for sustainability will result in fewer training restrictions; lower life-cycle costs, including operation and maintenance costs; enhanced well-being for Soldiers, their families, and neighboring communities; fewer regulated activities and less potential for enforcement actions/fines; enhanced productivity; real partnerships with key stakeholders to achieve common goals; and increased readiness.[40]

On the operational side, the Army also faces increasing limitations on its operational ranges and vulnerabilities with logistics. Concerning operational ranges, external factors such as urbanization; competition for airspace, land, and electro-magnetic spectrum; and the public's reduced perception of national security threats causes the challenges the Army is facing in regards to encroachment.

The Army’s extensive logistical tail is vulnerable to the enemy as it is currently experiencing in Iraq and Afghanistan. Supply convoys carrying food, water, fuel, spare parts, generators, furniture and other equipment leave supply points for destinations inside Iraq and Afghanistan. This logistics support tail creates problems for the Army, as the number of supply trucks on the road will provide yet more targets for the insurgents and their Improvised Explosive Devices (IEDs). The U.S. military has spent billions of dollars on IED countermeasures, including heavier armor for its High Mobility

Multipurpose Wheeled Vehicle (HMMWV) and trucks and electronic jammers, to neutralize the explosives. More recently, the Army is developing Mine Resistant Ambush Protected (MRAP) vehicles in order for Soldiers to survive IED attacks and ambushes. However, instead of IED countermeasures, the Army should look at sustainability to shorten its logistical tail and reduce the number of targets available to insurgents.

Reducing the demand for the transportation of supplies (particularly two commodities: water and fuel) would substantially cut the Army's logistics support tail, subsequently reducing its vulnerabilities to the enemy. For example, water can be generated onsite by two sustainable technologies – the Water Recover Unit from Exhaust (WRUE) and the Water from Air (WRA) systems.[41] The WRUE is a system that produces drinking water by capturing water from JP8/diesel fuel expended by any engine on the battlefield. The WRA is a system to produce drinking water by harvesting water from humidity sources including the atmosphere & crew compartments. Embedding these systems into current platforms will produce potable water for Soldiers down range.

The Army could meet tactical energy needs for forward-deployed forces and eliminate the need for a long logistical tail to deliver fuel for vehicles and terrestrial generators. Indeed, U.S. forces in Iraq consume approximately 56 million gallons of fuel per month.[42] This equates to a huge part of the logistics support tail.

Commanders must consider how to employ renewable energy systems thereby enhancing their operational ability and reducing unnecessary Soldier exposure to IEDs and enemy attack targeting fuel-hauling convoys. This would also allow significant

logistical weight reduction from handling and hauling fuel, which in turn, decreases vulnerability to the disruption of the energy supply. The Army should explore potential renewable sources of power (e.g. photovoltaic, wind, hydro, and/or biomass).[43] For example, the Army's Natick Soldier Systems Center is currently developing tents and uniforms made from flexible solar panels to make it more difficult to track Soldiers. These solar tents would reduce the need for diesel-powered generators and diminish the "thermal signature" that enemy sensors use to track troop location.

In July 2006, Marine Corp MG Richard Zilmer, Chief of Multi-National Forces West, sent a memorandum to the Pentagon identifying a crucial need for “a self-sustainable energy solution” to be available for use by U.S. forces in Iraq. MG Zilmer stated: “A proposed alternate solution – one that reduces the number of convoys while providing an additional capability to outlying bases – is to augment our use of fossil fuels with renewable energy, such as photovoltaic solar panels and wind turbines, at our outlying bases. By reducing the need for [petroleum-based fuels] at our outlying bases, we can decrease the frequency of logistics convoys on the road, thereby reducing the danger to our Marines, soldiers, and sailors…If this need is not met, operating forces will remain unnecessarily exposed to IED, RPG, and [small arms fire] theatres and will continue to accrue preventable …casualties resulting from motor vehicle accidents and…attacks,” “continued casualty accumulation exhibits potential to jeopardize mission success.”[44]

On a more futuristic vision, the Defense Advanced Research Projects Agency (DARPA) is researching the concept of collecting solar power in space and beaming it back to Earth. This technology could solve strategic and tactical security problems for

the U.S. and its deployed forces. As a clean source of energy that would be less dependent of logistical convoys, space solar power could ease the Army's tactical energy vulnerability.

The unsustainable state of the world affects national security globally, regionally and locally as well as the institutional and operational missions of the Army. Each of these examples shows the use of sustainability principles on the institutional and operational missions of the Army.

According to the Association of United States Army (AUSA) Torchbearers Report, the sustainability of the Army is "a true combat and national security multiplier".[45] Rapid degradation of and increased competition for resources threatens the ability of the Army to train and fight and has serious national security implications.

Institutionalizing Sustainability

Today's Army faces many challenges that force it to seek innovative solutions to difficult problems and the Army's unsustainable state is one of those challenges. The long-term solution that may have the best chance of success in meeting the diverse, complex and global nature of this challenge is using the sustainability framework and institutionalizing sustainability into the Army culture. By doing so, sustainability will connect Army activities today to those of tomorrow with sound business practices. The Army must strive to become system thinkers in order to benefit from the interrelationships of the institutional and operational missions, the community and the environment. To sustain the future, the Army must implement effective policies and practices that safeguard the mission, quality of life and the environment in a manner

that the nation expects. The solution to this challenge is integrating and institutionalizing sustainability principles into the way the Army does business.

Having said that, many organizations in the private and public sectors pursuing sustainability downplay it as simply the next 'flavor-of-the-month' in regards to being another better business practice -- much like Total Quality Management, Lean Six Sigma and Environmental Management Systems. Another quandary is that many organizations consider sustainability to be an environmental responsibility and therefore lays the onus on that organization's activity. The challenge with this position is that buried deep in the organizational hierarchy is the environmental staff who generally have little influence and limited authority as a change agent to effectively inculcate sustainability into that organization's operations and other functional areas.

Culture is the key to achieving the institutionalization of a desired effect. Culture may be defined as a common set of assumptions, practices, and ways of seeing and thinking. Culture is embedded in an organization and is an important element to the performance of a particular organization. Edgar H. Schein, a psychologist and organizational theorist, defines culture as a "pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems."[46]

For the Army, FM 6-22 *Army Leadership, Competent, Confident, and Agile*, defines culture as "[t]he set of long-held values, beliefs, expectations, and practices shared by a group that signifies what is important and influences how an organization

operates." It consists of "shared beliefs, values, and assumptions about what is important."[47] To integrate a cultural concept into an organization effectively, it must be recognized as a factor that affects organizational life. Critical elements of culture include observed behaviors when people interact (language, customs, traditions, rituals), group norms, values, embedded skills, and habits of thinking.[48] Other elements include organization structure, goals, charters, mission statements, myths, legends, stories, budget, published recruiting handbooks, and training.[49] Organizational stories, rituals, language, and symbols are the most observable as they publicly represent the values of the group.[50]

Embedding Mechanisms

Schein discusses the ways that leaders create or change cultures, including expected behaviors, through six "embedding mechanisms."[51] He maintains leaders may use these mechanisms to communicate what they believe in and therefore what "they systematically pay attention to." Furthermore, Schein discusses how leaders use these embedding mechanisms to create and change an organizational culture. Army senior leaders may use these mechanisms in order to change the organizational culture with the aim of inculcating sustainability into the Total Army.

Effective leaders acknowledge that their viewpoint influences their subordinates and that leader priorities become follower priorities. The leader transmits those viewpoints and priorities by many means—some directly but others indirectly or according to context. It is important that followers clearly understand the leader's expectations. Of paramount importance is leaders' awareness of how their points of view, priorities and actions will set standards for their followers' behaviors and values.

The first embedding mechanism is **what leaders pay attention to, measure and control**. Schein states that what leaders pay attention to, in a systematic way, communicates most clearly their vision, priorities, goals and assumptions. What subordinates notice, such as comments made, casual questions and remarks, become powerful if a leader uses it in a consistent manner. If a leader is inconsistent in a message, it will lead to confusion. Attention is focused in part by the kind of questions that leaders ask and how they set the agendas for meetings.[52] For example, Army senior leaders could convey their intent in embedding sustainability into their business processes via an authoritative statement such as a deployment order. The deployment order could state, among other things, the standup of a Headquarters, Department of the Army (HQDA) office to oversee sustainability and its deployment; the formal execution of sustainability including personnel, training and a strategic communication plan; responsibilities of subordinate headquarters and coordinating instructions for HQDA Staff, Army Commands (ACOM), Army Service Component Commands (ASCC) and Direct Reporting Units (DRU). The deployment order may also discuss strategic objectives and sustainability metrics used to measure progress.

The Assistant Secretary of the Army for Installations and Environment (ASA(I&E)) used this embedding mechanism to convey the importance of sustainability in the 2007-2012 Strategic Plan. In the strategic plan, the Honorable Keith Easton conveyed the message that "[s]ustainability is the paradigm that will focus our thinking to address present and future needs while strengthening community partnerships that improve our ability to organize, equip, train, and deploy our Soldiers as part of the joint force."[53] One of the objectives by 2010 is to institutionalize sustainability into all new building

construction and major renovation. In addition, one of the goals of the strategic plan is that "…sustainability must be embedded into all Army missions and functions to protect Soldiers, enhance operational capability, and strengthen community partnerships through more holistic systems thinking." Indeed, a deployment order and strategic plan would send a strong message to the Army community of the intent of Army senior leaders to embed sustainability into Army culture.

According to Schein, the second embedding mechanism used by leaders to create and change an organizational culture is a **leader's reaction to critical incidents and organizational crisis.** In a crisis, how does the leader deal with it? Does the leader create new norms, values and/or working procedures? Crises heighten anxiety, which motivates new learning, new concepts, and new ways of thinking. A crisis is what is perceived to be a crisis and this can be defined by the leader and acted upon accordingly.[54]

Ambushes and IED attacks on military supply convoys is a crisis the Army is currently facing. Army leaders may deal with the crisis by using sustainability principles to reduce its logistical tail and reduce the risk of attacks.

In addition, the Army is facing a crisis of shrinking manpower and resources. Due to spending billions of dollars on the war in Iraq and Afghanistan, the Army is indeed in a resource crisis. Senior leaders have already recognized this fact and reacted by using Business Transformation and Lean Six Sigma as tools to react to this crisis. The Army's vision of Business Transformation and Lean Six Sigma is an embedding method to address this organizational crisis. A similar vision of sustainability could likewise be an embedding mechanism for this organizational crisis.

The third embedding mechanism is **observed criteria for resource allocation.** Here, Schein states that resource allocation within an organization reveals the leaders assumptions and beliefs. How budgets are created reveals a leaders assumption – for example, what is an acceptable risk? In 2006, senior leaders sent a message throughout the Army when Secretary of the Army, Francis Harvey, and Chief of Staff of the Army, GEN Peter Schoomaker stood up the Office of the Deputy Under Secretary of the Army for Business Transformation (DUSA(BT)). Its purpose was focused on the establishment of methods and techniques for the promulgation of Business Transformation throughout the Army with special attention given to Continuous Process Improvement using Lean Six Sigma, Organizational Analysis and Design, and the effective and efficient application of Enterprise Solutions and knowledge-based situational awareness. Likewise, senior leaders would send a message Army-wide of their intent to institutionalize sustainability when they allocate the resources (funding and manpower) to stand up a sustainability office to execute its mission.

Deliberate role modeling, teaching and coaching is the fourth embedding mechanism. According to Schein, leader's visible behavior communicates assumptions and values to subordinates. A leader's own visible behavior has great value for communicating assumptions and values to others.[55] Senior leaders may convey messages using a variety of methods. Formal statements at town hall meetings, informal discussions during staff meetings, and video taping messages by the senior leaders are all powerful methods. Army senior leaders have emulated their message in a variety of ways. For example, in 2004, Acting Secretary of the Army Les Brownlee and Chief of Staff of the Army GEN Schoomaker outlined their philosophy of sustainability

through the *Army Strategy for the Environment*. Later, Secretary of the Army Francis Harvey, Chief of Staff of the Army GEN Schoomaker and Sergeant Major of the Army Kenneth Preston were featured in an Army video advocating the sustainability concept and the positive outcomes it can offer the Army.

Mr. Tad Davis, Deputy Secretary of the Army for Environment, Safety and Occupational Health (DASA(ESOH)), is a role model for teaching and coaching. Mr. Davis, a former garrison commander, coaches, encourages and provides guidance to military and civilian personnel on the advantages of sustainability and shares his experiences of integrating sustainability while stationed at Fort Bragg.

A potential means of sending a strong signal showing senior leader intent to inculcate sustainability into the Army's culture and business principles would be by standing up a new Office of the Deputy Undersecretary of the Army for Sustainability (DUSA(S)). The office would focus on the establishment of methods and techniques for the promulgation of sustainability throughout the Army with focus on operational and institutional sustainability.

Each of these deliberate role modeling, teaching and coaching embedding mechanisms would send a signal to the Army community that HQDA is intent and committed to the vision of a sustainable Army.

The fifth embedding mechanism is **observed criteria for allocation of rewards and status.** According to Schein, senior leaders convey their priorities, values and assumptions by linking rewards (and punishments) to the behavior they desire. What is rewarded or punished is a message. Members learn from their own experience with promotions, performance appraisals, and discussions with the boss. If something is to

be learned, there must be a reward system setup to insure it is retained.[56] The Army could use this embedding mechanism to reinforce their values and recognize sustainability successes at all levels of the Army organization. Army units could receive awards for successfully embedding sustainability into their business processes. When the Army rewards subordinate units with these types of awards, it reinforces its message of its priorities, values and assumptions.

Another example is recently the Vice Chief of Staff of the Army (VCSA) issued a memorandum instructing HQDA, ACOM, ASCC and DRUs to ensure that energy considerations are included in the functional responsibilities of their agencies, staffs and commands.[57] In addition, the memorandum instructed the Commander of the U.S. Army Installation Command (IMCOM) to ensure position descriptions of the Directors of IMCOM Regions and their subordinate commanders will include energy and water conservation responsibilities. Subsequently, HQ IMCOM Assistant G-1 for Civilian Personnel placed an energy conservation statement into the Standardized Garrison Organization (SGO) position descriptions for the Deputy Garrison Commander, Garrison Manager and the Director of Public Works. Indeed, energy and water conservation programs have now received a higher priority due to the issuance of the subject VCSA memorandum. Similar memorandums from the Secretary of the Army, Chief of Staff of the Army, and/or VCSA regarding sustainability would be very effective embedding mechanisms.

The sixth embedding mechanism is **observed criteria for recruitment, selection, promotion, retirement and excommunication**. Schein considers one of the more subtle ways of embedding assumptions into the culture is by the selection of members

to execute goals and objectives to meet the senior leader's vision. Adding new members to a staff or team is very telling because it is unconsciously done. In addition, who gets promoted and who does not sends a message that influences cultural change.[58] Recruiting, selecting and promoting individuals to staff and support a DUSA(S) office is certainly an effective sustainability embedding mechanism.

Strategic Communications

Strategic communication (SC) is an important part of an organization's daily operation and a SC plan is an important tool to embed sustainability across the Total Army. As a living document, it frames media activities, including internal and external communications, and clarifies the organization's priorities, target audiences, resources and staff assignments. A SC plan affirms and is driven by the organization's goals and outcomes, its vision, as expressed in a mission statement, and its values and beliefs. The activities in the SC plan should support the organization's overall communications goals. What gets measured, gets done so it is important to set measurable goals in order to gauge the progress along the way.

A SC plan provides a directional framework for effectively communicating targeted messages to key internal and external audiences. The intention of the plan is to focus communications in an effort to improve audience awareness, relationships and advocacy. It provides a framework to accurately disseminate information and ensures that the Army is communicating the right messages, to the right audiences, at the right time.[59] Effective communication plays a crucial role in actions such as building trust and credibility with stakeholders; establishing long-term relationships; sharing expertise and

insights; and fostering an understanding of sustainability's role in supporting the Soldier.[60]

There are a number of critical imperatives organizations need to build into a SC plan. These include an understanding of the target audience and how to reach it; research into past media coverage and public opinion about the issues; messages to be delivered; materials to be produced; financial resources from which staff and equipment will be drawn; and a written work plan. Elements of a SC plan include determining the goal(s); identifying and profiling the audience; developing messages; selecting communication channels; choosing activities and materials; establishing partnerships; implementing the plan; and evaluating and making mid-course corrections.

The HQDA Office of the Chief of Public Affairs (OCPA) has drafted a "Sustainability Communication Campaign Plan" addressing many of these elements.[61] The (draft) Campaign Plan discusses the strategic context of sustainability, current issues, an overarching communication strategy and its desired effects, measures of effectiveness, an execution matrix including milestones, 'products' used to convey the messages, and an analysis of the audience. This plan frames media activities, including internal and external communications, clarifies the Army's priorities, target audiences, and staff assignments.

Recommendations

The following recommendations discuss the ways and means the Army may institutionalize sustainability into the Army culture. Recommendations include identifying a sustainability champion; forming a HQDA Council of Colonels; providing training and resources; use collaboration as an enabler; taking a vertical and horizontal approach for

inculcating sustainability into the Army culture; and leveraging strategic communication in order to effectively convey the Army's sustainability message.

Sustainability Champion

The Army needs to assign organizations to take the lead in developing policy and inculcating sustainability principles across the Total Army. Because of the institutional and operational missions, HQDA should designate separate sustainability champions or co-champions. These sustainability champions would be the central points of contact to develop the Army's capability for implementing sustainability across all functional areas.

For the institutional mission, the Army should create an Office of the Deputy Undersecretary of the Army for Sustainability (DUSA(S)). The focus of this office would be to establish methods and techniques for the promulgation of sustainability throughout the institutional Army. If standing up a DUSA(S) is not feasible, an alternative is the current Office of the Deputy Under Secretary of the Army for Business Transformation (DUSA(BT)). This office could fulfill this mission, as sustainability is a Business Transformation process. Since its inception, DUSA(BT) has focused on the establishment of methods and techniques for the promulgation of Business Transformation throughout the Army.

For the operational mission, the Deputy Chief of Staff (DCS), G-3/5/7 should be the champion as this office defines the requirements for the operational Army. General Orders No. 3 states that the DCS, G-3 is responsible for operations and planning functions for the DA including, but not limited to, "…[s]erving as the ARSTAF focal point for organization, integration, decision-making, and execution of the spectrum of activities encompassing requirements definition, force development, force integration,

force structuring, combat developments, training developments, resourcing, and prioritization."[62] [63] The focus of DCS, G-3 would be to establish methods and techniques for the promulgation of sustainability throughout the operational Army.

At the tactical level for the institutional Army, there should be a sustainability champion at the installation strategic planning office. The IMCOM's SGO initiative provides garrison structure with consistent functions, names and processes across all installations and a common platform to deliver services with common standards. Currently, SGO for IMCOM installations has a Plans, Analysis and Integration Office (PAIO) reporting directly to the garrison commander. This office is the garrison commander's focal point for strategy and management planning for installations and should be assigned responsibilities for championing sustainability across all functional areas of the installation. Non-IMCOM installations[64] should follow the same organizational standard and assign their respective strategic planning offices as the sustainability champion.

Currently, the Army's environmental community is predominately championing installation sustainability, which in effect, makes it an environmental initiative. In order for sustainability to be effective across the Total Army -- institutionally, operationally, and cross-functionally – the Army must take sustainability out of the environmental arena and give responsibility to a more overarching entity.

Council of Colonels

The Army should stand up a Council of Colonels (CoC) at HQDA to review and analyze sustainability issues, discuss solutions and prepare recommendations for the Secretary of the Army and Chief of Staff of the Army. A group of colonels or civilian

equivalents will make up the CoC and the sustainability champions, DUSA(S) or (BT) and DCS, G-3 will serve as co-chairs. CoC members will coordinate sustainability issues with their respective agencies as well as present their agency's position on issues. The group will frame issues, package proposals, and otherwise coordinate matters that come before the group and discuss possible courses of actions. The CoC will provide recommendations to, and execute guidance from the Secretary of the Army and Chief of Staff of the Army to pursue significant improvements in the rapid projection of inculcating sustainability across the Total Army.

Training

The Army should integrate sustainability training into Army command leadership courses. Applying sustainability principles requires a new type of manager that is multi-skilled, performs successfully in a results oriented organization, and is committed to life-long learning as an integral part of his or her profession. Skill sets of Soldiers and civilians will need to include sustainability concepts at the earliest opportunity. Examples of opportunities for Soldier and civilian education on sustainability principles are the U.S. Military Academy, Basic Combat Training, Advanced Individual Training, Warrior Leadership Course, Basic Officer Leaders Course, Captains Career Course, Civilian Education System[65], and the Senior Officer and Enlisted Service Schools. Sustainability training for more senior level officers and NCO’ s should be offered at the General Officer Installation Commander's Course, the Garrison Precommand Course, the Directorate of Plans, Training, Mobilization and Security Course, the Garrison Command Sergeant Major Course, the U.S. Army War College and the Civilian Education System Intermediate and Advanced courses.

In addition, the Army should integrate sustainability principles into the Warrior Ethos and Army Values.[66] The Warrior Ethos forms the foundation for the Soldier's spirit and total commitment to victory, in peace and war, always exemplifying ethical behavior and Army values. Applying sustainability principles into the Warrior Ethos and Army Values will better the personal and professional lives of our Soldiers and make the Army a better and even more respected institution.

Resources

The Army has enormous buying power, which it should leverage across its full spectrum of operations to include acquisition of sustainable weapon systems, green procurement, renewable energy, tactical and non-tactical alternative fueled vehicles, and facility design and construction.

The Army should commit resources (funding and manpower) towards sustainability. In doing so, the Army should: (1) create a new Sustainability Management Decision Package (MDEP); (2) identify the Program Evaluation Group (PEG); (3) designate the specific MDEP manager and the organization, the program and its function; and (4) defend and record the resources needed to get the intended output. The MDEP should specify the military and civilian manpower and dollars associated with the program undertaking, display needed resources across relevant Army commands and relevant appropriations, and justify the resource expenditures. The Army should provide funding for a sustainability program manager for each installation/garrison and operational unit (e.g. numbered corps, divisions, brigades, and battalions as appropriate).

The MDEP should provide dollars for a Sustainability Investment Fund (SIF). The SIF should be used to provide seed money for and investment in sustainability projects such as the utilization of solar power and alternative fuels, technology to design sustainable weapon systems and platforms, green building initiatives, EPA Energy Star purchases, water savings projects and an Army sustainability awards program. The SIF should use funds for initiatives in support of EO 13423.

Finally, installations and operational units realizing cost saving from sustainability initiatives (e.g. a project reducing the amount of water consumed) should be able to reinvest (fully of partially) by endowing the savings back into the SIF, reinvesting into other sustainability projects, or other investments such as initiatives to enhance quality of life issues for our Soldiers and families.

Collaboration

The Army should collaborate with its sister services and other U.S. Government Interagencies. This would offer an extraordinary opportunity for partnerships and information exchanges among all interested parties. The Army, Navy, Marine Corps and Air Force share similar challenges to sustain their respective missions and operations today and into the future. Moreover, each service and interagency enjoys a certain amount of Congressional support where a collaborative effort could realize synergetic benefits for all parties. A DoD Sustainability Steering Committee chaired by the Office of the Secretary of Defense should be formed to provide guidance and coordination among the military services.

Regarding the interagency community, there is currently an Interagency Sustainability Working Group (ISWG) encompassing 20 Federal departments and

agencies including DoD.[67] However, the ISWG limits its focus on sustainable design and development for construction and provides, among other things, interagency assistance for implementing EO 13423 for sustainable building design requirements. The IWSG charter should be expanded beyond green buildings and encompass sustainability principles across all interagency functional areas. For example, the National Aeronautics and Space Administration (NASA) has a blossoming sustainability program as their personnel and facilities engineers strive to reduce the impact of their operations on the planet.

The Army should also participate with the EPA in their Laboratories for the 21st Century program to advance sustainable design concepts in high technology laboratories and facilities. In addition, the EPA has programs, policy tools, and incentives to assist DoD and the interagencies to be good stewards of the Earth's resources and to make sound sustainable choices. The DoD should partner with other government agencies in pursuit of a more sustainable future.

Vertical and Horizontal Approach

For the Total Army to achieve sustainability, it must take a holistic approach – vertically and horizontally -- to inculcate sustainability operationally and institutionally. Vertically, the Army must take a "top-down" and "bottom-up" approach. Top down includes the promulgation of policy and direction from HQDA[68] down through command channels. Institutionally, the top down approach includes HQDA, ARCOMs, ASCCs, DRUs, installations, garrisons and depots. Operationally, the top down approach includes the numbered armies, corps, divisions, brigades, and battalions that conduct full spectrum operations around the world. A bottom up approach occurs as installations

and operational units execute sustainability initiatives with results of their successes and failures reported up the chain of command. The CoC support staff would then compile and analyze the data to determine such things as lessons learned and return on investment for the sustainability projects.

A cross-functional approach is necessary to institutionalize sustainability horizontally as well. This includes, but is not limited to, organizations and activities from the G-1, G-2, G-3/5/7, G-4, G-6, G-8, Assistant Chief of Staff for Installation Management, Chief of Engineers, Assistant Secretaries of the Army (Manpower and Reserve Affairs), (Installations and Environment), (Civil Works), (Acquisition, Logistics, and Technology) and (Financial Management and Comptroller), Judge Advocate General, Director, Army National Guard, Chief, Army Reserve, Surgeon General, Chief of Public Affairs, and Director of the Army Staff at HQDA and their respective counterparts at the lower echelons.

Strategic Communications

The Army should develop a robust strategic communications plan. A SC plan provides the directional framework needed to effectively communicate targeted messages to key internal and external audiences. OCPA should continue its efforts with the Sustainability Communication Campaign Plan and expand its scope to emphasize the institutional and operational missions of the Army. OCPA should develop a sustainability White Paper and an informational brochure from the Secretary of the Army and Chief of Staff of the Army.[69] Army senior leaders should include the Army's sustainability efforts in their speeches and messages.

Conclusions

Army sustainability is a national security imperative. The choices that the Army makes today will impact its ability to function in tomorrow's global security environment of decreasing resources and increasing demand.

Sustainability impacts the institutional and operational missions of the Army. Implementing sustainability makes good business sense for the Army with tangible and intangible benefits. For the institutional mission, success for installations will result in fewer training restrictions; lower life-cycle costs; enhanced well-being for Soldiers, families, and neighboring communities; enhanced productivity; and increased readiness. Operationally, Army logistical units that provide resources to combat forces are vulnerable to attack. Sustainable practices and technologies decrease the Army's dependence on natural resources, thereby decreasing vulnerabilities and operational signature.

A sustainable Army will not take place overnight. However, the Army must move out today and institutionalize it, as there is an obligation to protect and preserve our resources for our future generation of Soldiers. We are in affect 'leasing' the Earth today and it is incumbent on the Army to be stewards of the resources for which it has been bestowed.

Endnotes

[1] U.S. Department of the Army, *Assistant Secretary of the Army for Installations and Environment Strategic Plan, 2007-2012* (Washington, DC: U.S. Department of the Army, 2007), available from http://www.asaie.army.mil/Public/IE/StratPlan/ strategicplan.html; Internet; accessed 23 January 2008, ii.

[2] Association of the United States Army. Torchbearer National Security Report. *Sustaining the Mission, Preserving* the *Environment*, Securing the Future (Arlington, VA: Association of the United States Army, February 2007), 5.

[3] U.S. Department of the Army, *2007 Army Posture Statement, Addendum K*.; available from http://www.army.mil/aps/07/addendum/k.html; Internet; accessed 14 November 2007.

[4] Robert, Karl-Henrik, J. Holmberg, and K. Eriksson. *Socio-ecological Principles for a Sustainable Society: Scientific Background and Swedish Experience*. Conference paper for meeting of the International Society for Ecological Economics (ISEE), Costa Rica, 1994, 24-26.

[5] Brian B. Nattrass and Mary Altomare, *Dancing with the Tiger* (Gabriola Island, B.C.: New Society Publishers, 2002), 271.

[6] For background on The Natural Step, go to www.thenaturalstep.org.

[7] United Nations. *Report of the World Commission on Environment and Development,* General Assembly Resolution A/RES/42/187, 11 December 1987; available from http://www.un.org/documents/ ga/res/42/ares42-187.htm; Internet: accessed 11 November 2007.

[8] *Background Paper on Sustainability for City Council Work Session*, Eugene, OR, 8 September 1999; available from http://www.propertyrightsresearch.org/articles6/ background_paper_on_ sustainabili.html; Internet; accessed 15 November 2007.

[9] Theodore Roosevelt “The New Nationalism" speech, Osawatomie, KS, 31 August 1910.

[10] Also known as “Corporate Environmental Management”.

[11] U.S. Department of the Army. *The Army Strategy for the Environment – Sustain the Mission, Secure the Future,* 01 October 2004; available from http://www.sustainability.army.mil/ overview/ ArmyEnvStrategy.pdf; Internet; accessed 09 September 2007.

[12] U.S. Department of the Army, *Army Logistics Readiness and Sustainability*, Army Regulation 700-138, Logistics (Washington, DC: U.S. Department of the Army, 26 February 2004).

[13] National Defense Center of Environmental Excellence, *Draft Army Installation Sustainability Process Integration and Technology Insertion* (Arlington, VA: 28 November 2005), 3.

[14] David S. Eady, Rochie E. Tschirhart, Jorge A Vanegas, Ph.D., and Ronald D. Webster, P.E., “Searching For Sustainability in an Encroaching and Transforming World,” DRAFT White Paper (22 April 2002), 16.

[15] For information regarding the institutional and operational organizations of the Army may be found at: http://www.army.mil/institution/organization/.

[16] Leadership in Energy and Environmental Design (LEED) is a green building rating system and the nationally accepted benchmark for the design, construction and operation of high performance green buildings.

[17] Greg Kats, “The Costs and Financial Benefits of Green Buildings: A Report to California’s Sustainable Building Task Force.” October 2003; available at http://www.usgbc.org/Docs/News/News477.pdf; Internet; accessed 18 November 2007.

[18] Joseph J. Romm and William D. Browning. “Greening the Building and the Bottom Line: Increasing Productivity Through Energy-Efficient Design,” Snowmass, CO: Rocky Mountain Institute, December 1994, 1.

[19] *U.S. Army, 2008 Army Posture Statement, A Campaign Quality Army with Joint and Expeditionary Capabilities* (Washington, DC: U.S. Department of the Army, 2008), 1.

[20] National Defense Center of Environmental Excellence, 1.

[21] U.S. Department of Defense, *Report to Congress on Sustainable Ranges*, The Office of the Secretary of Defense, Under Secretary of Defense (Personnel and Readiness), Washington, DC: February 2006.

[22] Assistant Secretary of the Army for Installations and Environment Organization Overview briefing, n.d., available from www.asaie.army.mil/Public/IE/doc/overview.ppt; Internet; accessed 31 December 2007.

[23] Association of the United States Army, 3.

[24] Kurt M. Campbell, et al, *The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change* (Washington, DC: Center for Strategic and International Studies and The Center for a New American Society, November 2007), 6.

[25] Association of the United States Army, 5.

[26] Campbell, 6.

[27] Ibid., 17.

[28] Ibid., 18.

[29] Ibid., 20.

[30] Ibid., 6.

[31] Kent H. Butts, PhD, *Climate Change and Security*, Testimony to the Committee on Science and Technology, Subcommittee on Investigations and Oversight, U.S. House of Representatives, Hearing on the “National Security Implications of Climate Change,” 27 September 2007.

[32] Kurt M. Campbell, 104.

[33] *The Army Strategy for the Environment: Sustain the Mission – Secure the Future*, 1 October 2004, available from http://www.asaie.army.mil/Public/ESOH/doc/ArmyEnvStrategy.pdf; Internet; accessed 15 October 2007.

[34] National Defense Center of Environmental Excellence*. Draft Army Installation Sustainability Process Integration and Technology Insertion*. 28 November 2005, 4.

[35] William F. FitzPatrick, *The Lessons of Massachusetts Military Reservation*, Strategy Research Project (Atlanta Georgia: U.S. Army Environmental Policy Institute, April 2001), 22-27.

[36] National Defense Center of Environmental Excellence*. Draft Army Installation Sustainability Process Integration and Technology Insertion*. 28 November 2005, p. 3.

[37] Ibid., 4.

[38] Ibid., 4.

[39] Ibid., 7.

[40] Ibid, 27.

[41] The water-harvesting technology was originally conceived by the Defense Advanced Research Projects Agency (DARPA), which sought ways to ensure sustainable water supplies for U.S. combat troops deployed in arid regions like Iraq.

[42] Association of the United States Army, 16.

[43] COL Gordon D. Kuntz, *Use of Renewable Energy in Contingency Operations*, Civilian Research Project (Arlington, VA: Army Environmental Policy Institute, March 2007), 10.

[44] Mark Clayton, "In the Iraq War Zone, U.S. Army Calls for 'Green' Power." *The Christian Science Monitor*, 7 September 2006, p. 1, available from http://www.csmonitor.com/2006/0907/p01s04-usmi.htm; Internet; accessed 22 December 2007.

[45] Association of the United States Army, 3.

[46] Edgar H. Schein, *Organizational Culture & Leadership (notes compiled by Ted Nellen),* (San Francisco: Jossey-Bass, 1992); available from http://www.tnellen.com/ted/tc/schein.html; Internet; accessed 24 November 2007.

[47] U.S. Department of the Army, *Army Leadership, Competent, Confident, and Agile,* Field Manual 6-22 (Washington, DC: U.S. Department of the Army, October 2006), 6-7.

[48] Edgar H. Schein, *Organizational Culture and Leadership* (San Francisco, CA: Jossey-Bass Publishing, 1992), 8-9.

[49] Ibid, 180-184.

[50] Patrick E. Conner and Linda K. Lake, *Managing Organizational Chang,* 2d ed. (Westport, CT: Praeger Publishers, 1994), 172.

[51] Edgar H. Schein. "How Founders and Leaders Embed and Transmit Culture: Socialization from a Leadership Perspective." *Organizational Culture and Leadership*, 2d ed. (San Francisco, CA: Jossey Bass, 1992), 186.

[52] Edgar H. Schein, *Organizational Culture & Leadership (notes compiled by Ted Nellen),* (San Francisco: Jossey-Bass, 1992); available from http://www.tnellen.com/ted/tc/schein.html; Internet; accessed 24 November 2007.

[53] Strategic Plan 2007-2012, "Installations As Flagships of Readiness", Office of the Assistant Secretary of The Army For Installations and Environment, (Washington, DC: U.S. Department of the Army), ii.

[54] Edgar H. Schein, *Organizational Culture & Leadership (notes compiled by Ted Nellen),* (San Francisco: Jossey-Bass, 1992); available from http://www.tnellen.com/ted/tc/schein.html; Internet; accessed 24 November 2007.

[55] Ibid.

[56] Ibid.

[57] U.S. Department of the Army Memorandum, Office of the Vice Chief of Staff, Subject: Army Energy Conservation, 22 June 2007.

[58] Edgar H. Schein, *Organizational Culture & Leadership (notes compiled by Ted Nellen),* (San Francisco, CA: Jossey-Bass, 1992); available from http://www.tnellen.com/ted/tc/ schein.html; Internet; accessed 24 November 2007.

[59] Office of the Assistant Secretary of the Army for Acquisitions, Logistics and Technology (OASA(ALT)), Department of the Army, *Strategic Communication Plan*, (Washington, DC: U.S. Department of the Army, 2007), 2.

[60] Ibid, 5.

[61] U.S. Department of the Army, *Army Sustainability Communication Campaign Plan*, Draft Briefing, n.d., Office of the Chief of Public Affairs, (Washington, DC: U.S. Department of the Army).

[62] U.S. Department of the Army, *General Orders No. 3, Assignment of Functions and Responsibilities Within Headquarters*, *Department of the Army*, (Washington, DC: U.S. Department of the Army, 9 July 2002), 22.

[63] On April 1, 2005, the Army Chief of Staff redesignated the Deputy Chief of Staff, G-3 as the Deputy Chief of Staff, G-3/5/7 with responsibility for Operations, Strategic Plans and Policy, Force Management, Training, Battle Command, and Capabilities Integration.

[64] For example, the Army Materiel Command and Medical Command installations.

[65] TRADOC has a progressive and sequential leader development system called the Civilian Education System (CES) that provides enhanced leader development and education opportunities for Army Civilians. CES consists of four courses – Foundation Course, Basic Course, Intermediate Course and Advanced Course.

[66] The seven Army Values are Loyalty, Duty, Respect, Selfless Service, Honor Integrity, Personal Courage (LDRSHIP).

[67] More information may be found at http://www1.eere.energy.gov/femp/sustainable/sustainable_workinggroup.html.

[68] To include the Secretariat and Army Staff.

[69] Similar to the Army Strategy for the Environment (located at http: www.asaie.army.mil/Public/ESOH/doc/ArmyEnvStrategy.pdf).